B Tech CSE 4th Semester May 2019

University Institute of Engineering & Technology

(Recognised Under Section 2(f) and 12B of UGC)

Kurukshetra University, Kurukshetra

Roll No. -

THEORY EXAMINATION – MAY 2019	
B.TECH - CSE	**SEMESTER - IV**

TIME – 3 Hrs.

M.M. - 75

COURSE NO. - AS-201	**COURSE TITLE - Mathematics-III**

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A (15 Marks)

Q. No. – 1 Answer the following questions. **15x1=15**

(i)	The value of the constant term in the Fourier series expansion of $cos^2 x$ in $(-\pi, \pi)$ is A. 1 B. $\frac{1}{2}$ C. $\frac{\pi}{2}$ D. None of these.
(ii)	If $f(x)$ is discontinuous at $x = a$, then the sum of the Fourier series of $f(x)$ at $x = a$ is A. $f(a+)$ B. $f(a+) + f(a-)$ C. $\frac{1}{2}[f(a+) + f(a-)]$ D. None of these.
(iii)	If $F\{f(x)\} = F(s)$, then $F[cosax\, f(x)] = \frac{1}{2}[F(s+a) + F(s-a)]$. This property is known as A. Linearity property B. shifting property C. Modulation property D. None of these.
(iv)	If $F\{f(x)\} = F(s)$, then $F[f(x-1)]$ is A. $e^s F(s)$ B. $e^{-s} F(s)$ C. $e^{is} F(s)$ D. None of these.
(v)	Fourier sine transform of $e^{-ax}, a > 0$ is A. $\frac{s}{a^2+s^2}$ B. $\frac{a}{a^2+s^2}$ C. $\sqrt{\frac{2}{\pi}}\frac{s}{a^2+s^2}$ D. None of these.
(vi)	If $u + iv$ is analytic, then $2iu - 2v$ is A. not analytic B. analytic C. constant D. None of these.
(vii)	The function $f(z) = \lvert z \rvert^2$ is A. not analytic B. analytic C. does not satisfy the C-R equations at (0,0) D. None of these

(viii)	The function $u(x,y) = 3x^2y + 2x^2 - y^3 - 2y^2$ is A. not differentiable B. harmonic C. not harmonic D. None of these
(ix)	The image of the circle $\|z\| = 2$ under the map $w = \frac{1}{z}$ is A. a circle of radius 2 B. a circle of radius $\frac{1}{2}$ C. a circle through origin D. None of these.
(x)	The invariant points of the transformation $w = \frac{3z-5}{z+1}$ are A. $i, -i$ B. $2i, -2i$ C. $1+2i, 1-2i$ D. None of these.
(xi)	The analytic function $f(z) = u + iv$ has real part $u = e^x siny$ is A. $e^z + c$ B. $ie^z + c$ C. $-ie^z + c$ D. None of these.
(xii)	The standard deviation of a Poisson distribution is A. m B. $\sqrt{m}$ C. 1 D. None of these
(xiii)	The variance for a binomial distribution is A.np B. $\sqrt{np}$ C. npq D. $\sqrt{npq}$
(xiv)	A feasible solution to the linear programming problem should A. Satisfy the problem constraints B. Optimize the objective function C. Satisfy the problem constraints and non-negativity restrictions D. Satisfy the non-negativity restrictions.
(xv)	Objective of linear programming problem for an objective function is to A. Maximize or Minimize B. Subset or proper set modeling C. Row or Column Modeling D. Adjacent Modeling

PART-B (20 Marks)

	UNIT-I	
2	Obtain the half-range sine series for the function $f(x) = x^2$ in the interval $0 < x < 3$.	5
	UNIT-II	
3	Find an analytic function whose imaginary part is $e^{-x}(x\cos y + y\sin y)$.	5
	UNIT-III	
4	A problem in mechanics is given to three students A, B and C whose chances of solving it are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved.	5
	UNIT-IV	
5	Solve graphically the following L.P.P: Maximize $Z = 2x_1 + 3x_2$ Subject to $x_1 + x_2 \leq 30,\ x_2 \geq 3, 0 \leq x_2 \leq 12,$ $x_1 - x_2 \geq 0, 0 \leq x_1 \leq 20.$	5

PART-C (40 Marks)

	UNIT-I	
6	Obtain the Fourier series for the function $f(x) = \begin{cases} \pi x, & 0 \le x \le 1 \\ \pi(2-x), & 1 \le x \le 2. \end{cases}$	**10**
7	Express the function $f(x) = \begin{cases} 1, & for\ \|x\| \le 1 \\ 0, & for\ \|x\| > 1 \end{cases}$ as a Fourier integral. Hence evaluate $\int_0^\infty \frac{\sin\lambda \cos\lambda x}{\lambda}\, d\lambda$.	**10**
	UNIT-II	
8	Define Analytic function and then prove that an analytic function with constant modulus is constant.	**10**
9	Prove that the function defined by $f(z) = \sqrt{\|xy\|}$ satisfies Cauchy-Riemann equation at the origin, but it is not analytic at that point.	**10**
	UNIT-III	
10	If mean and variance of a binomial distribution are 4 and 2 respectively, find the probability of (i) exactly 2 success (ii) less than 2 success (iii) at least 2 success.	**10**
11	In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10, use Poission distribution tocalculate the approximate number of packets containing no defective blade, one defectiveblade and two defective blades respectively in a consignment of 10,000 packets.	**10**
	UNIT-IV	
12	Solve the following L.P.P: Maximize $Z = 2x_1 + x_2 + 105x_3$ Subject to $-6x_1 + x_2 + 14x_3 \le 7$, $-12x_1 + x_2 + 32x_3 \le 10$, $-x_1 - x_2 + 3x_3 \le 0$, $x_1, x_2, x_3 \ge 0$.	**10**
13	Solve the following linear programming problem by simplex method: Maximize$Z = 2x_1 + x_2 - x_3$ subject to $x_1 + x_2 \le 1$, $x_1 - 2x_2 - x_3 \ge -2$, $x_1, x_2, x_3 \ge 0$.	**10**